  

Science in a Bag – Student Page

Motion

Grade Level

Fifth Grade

Standards

GLE 0507.11.1 Design an investigation, collect data and draw conclusions about the relationship among mass, force, and distance traveled.

CU 0507.11.1 Predict how the amount of mass affects the distance traveled given the same amount of applied force.

✓0507.Inq.3 Maintain a science notebook that includes observations, data, diagrams, and explanations.

Task Objective

Students should be able to predict how the amount of mass affects the distance traveled given the same amount of the applied force.

Materials Needed

-Plastic cups

-Balloons

-Mini Marshmallows

-Large Marshmallows

Procedures

1. Do not eat marshmallows.

2. Take out a cup and a balloon.

3. Place a balloon over the top part of the cup, which is the side with the larger opening. The tail of the balloon should be sticking out of the outside of the cup. Make sure the balloon is tightly on the cup. If there is a hole in it use another balloon.

4. Before getting a marshmallow, write a prediction in the learning log about whether you think the amount of force given will determine how far the marshmallow will go. Then, predict whether the small marshmallow will go farther than the large marshmallow.

5. After making your prediction grab a small marshmallow and place inside the cup. Make sure the marshmallow is all the way in the back of the cup next to the balloon.

6. Hold the cup so that the marshmallow does not fall out and that the tail of the balloon is facing you. Pull the tail of the balloon towards yourself. Then let go of the tail.

7. Observe how far the marshmallow travels.

8. Using the same marshmallow, repeat the procedure two more times applying the same amount of force each time.

9. Then do the procedure three more times, but apply a different amount of force each time. Then look back at your predictions in your learning log and see if your predictions were right.

10. Lastly try shooting a large marshmallow three times just like you did with the small marshmallows.

Assessment

*Answer these questions in your Learning Log*

-Did the amount of force given determine the distance of the marshmallow?

-Did changing the amount of force change the result of the marshmallow?

-Why do you think the small marshmallow travels farther than the large marshmallow?

-Do you think the weight difference between the small marshmallow and the large marshmallow affect the distance traveled?

Clean-up

Put marshmallows and balloons back into their designated bag, and place ALL other items neatly back into the box.

Science in a Bag – Teacher Page

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Explanation

In this activity students will learn that the amount of applied force given can affect the distance the marshmallow travels. They should notice that if they apply more force then their small marshmallow will go farther than if they apply less force. Students will also learn that the amount of mass affects the distance the marshmallow shooter will shoot the marshmallow. They should also notice that the smaller marshmallows travel much farther than the large marshmallow due to the weight change.

Common Misconceptions

A common misconception that students tend to make is that objects are kept moving by internal forces instead of external forces. However, the object in motion will lose momentum as the force disappears.

Real World Connection

Everything in the universe is in motion, whether its fast or slow. Whether it’s a ball being thrown, Ferris wheel, or the Earth, motion is happening all the time. Force is what assists motion. It is needed to get the motion moving or to change the motion.

Connections Across the Curriculum

**Math:**

-GLE 0506.5.1 Make, record, display and interpret data and graphs that include whole numbers, decimals, and fractions.

CU 0506.5.3 Design investigations to address a question and consider how data collection methods affect the nature of the data set.

-In math motion can be used to record how far the object travels, then collect the data. In the end, the students can compare the data they collected, and see if there are any similarities between their data and other student’s data.

**Language Arts:**

-GLE 0501.4.2 Collect, organize, determine reliability, and use information researched.

SPI 0501.4.3 Complete a graphic organizer (e.g., chart, web) organizing material collected from text or technological sources.

-Language Arts can be helpful in learning motion by having students do research. They can collect data from experimenting with the object, and organize the data by putting it into a graphic organizer, such as a chart.

**Art:**

-Checks for Understanding 2.1 Examine and explain (written and/or verbal) the perceived intent of the elements of art in selected artwork of others. Examine and explain (written and/or verbal) the intended purpose in one’s own artwork.

-The teacher can find an artwork that has an object in motion and have the students examine the artwork, then write about how the artwork shows motion. Then the students can draw their own artwork showing an object of their choice in motion, and describe their artwork and why it resembles motion.

References

Instructions for marshmallow shooter:

<http://tekyteach.blogspot.com/search/label/science>

To learn about Motion, Force, and Mass:

<http://www.cyberphysics.co.uk/topics/forces/force.htm>

<http://www.physics4kids.com/files/motion_intro.html>

Misconceptions about Force:

<http://www.apa.org/education/k12/alternative-conceptions.aspx>